DOES FIRM DIVERSIFICATION REPRESENT A VALUE ADDED FOR STOCKHOLDERS?

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ABSTRACT

This study empirically tests the effect of diversification on firm performance, controlling for factors influencing returns other than diversification. This study also investigates if the diversification effect has the same impact on firm performance at different points in time. The sample used consists of all firms with available data from Compustat Industry Segment Database and Research Files for the period between 1979 and 2006. Carhart (1997) four-factor model results suggest that diversification is related to firm performance. Diversified firms show a general trend of underperforming non-diversified firms. Results also suggest that the diversification effect may change through time. The evidence presented may help managers and stockholders in considering the effects of diversification on firm value when making decisions.

JEL: G11; G34

KEYWORDS: Diversification strategy, firm performance

INTRODUCTION

Why firms diversify is a question that has been studied broadly in corporate finance. Moreover, academics, management and stockholders have demonstrated interest in the effects that diversification may have on firm performance. Previous research on this topic has shed some light on the issue (Campa & Kedia, 2002; Hyland & Diltz, 2002; Pandya & Rao, 1998; Servaes, 1996). Despite the use of different samples, time frames or methodologies there is no agreement as to how diversification affects firm performance.

There is insufficient corroborating empirical evidence to produce a consensus on the consequences of firm diversification. Some studies favor the notion that diversification is related to a performance discount, while others find that diversification leads to an enhancement in performance. A third group of academics state that diversification does not affect performance. This study contributes to the existent literature by implementing a more accurate and reliable methodology, Carhart's (1997) four factor model. A longitudinal study is also performed to evaluate if the diversification effect has the same impact on firm performance at different moments across time. Both, the stockholders and the firm's upper management, could use this information as guidelines to their investment decisions and strategic planning

The remainder of the paper is organized as follows. Section 2 briefly discusses the relevant literature. Data selection, research methodology, and empirical models are described in Section 3. Section 4 provides analysis and interpretations of the empirical results and Section 5 concludes the paper.

LITERATURE REVIEW

The main objective of most financial decisions is to increase shareholder wealth. Most of these decisions are made expecting positive and constant growth. Corporate growth normally occurs when there is an internal expansion. This type of expansion takes places when the existing divisions of the firm grow

through normal capital budgeting activities. However, past studies agree and answer the initial question of why do firms diversify. The most remarkable examples of growth occur as a consequence of mergers and acquisitions (Brigham & Daves, 2004).

Corporate mergers and diversification can be explained from two viewpoints: synergistic strategies and financial strategies. Economies of scale, economies of scope and market power are synergistic. Alternatively, profit stability, improvement of financial performance and agency problems are considered financial strategies.

Whether firm diversification is synergistic or financial in nature, this decision will influence firm performance. Three different theoretical positions have been proposed regarding the diversification effect in firm performance: (1) diversification reduces firm performance, (2) diversification enhances firm performance and (3) diversification does not have direct influence on firm performance.

There is evidence that suggests diversification deteriorates firm performance and diminishing shareholder wealth (Berger and Ofek, 1995; Lang and Stultz, 1994; Servaes, 1996). Lang and Stulz (1994) show that diversified firms have lower q's than comparable portfolios of pure-play firms. They also explain that firms which choose diversification are poor performers relative to firms that do not. Berger and Ofek (1995) also find a value loss from diversification (about 14 percent loss) in the 1980s, while Servaes (1996) finds a diversification loss in the 1960s but to a lesser extent in the 1970s.

Numerous studies point out that a reduction in firm performance may occur because the costs of diversification outweigh the benefits. Some explain that these costs may arise from inefficient allocation of capital among divisions of a diversified firm (Lamont & Polk, 2001; Rajan, Servaes & Zingales, 2000). Agency problems in a diversified firm can also generate additional costs of diversification. Diversified firms may suffer from agency problems because of division manager's opportunistic or sub-optimal behavior, information asymmetries between central and divisional managers and difficulties in designing optimal incentive compensation schemes (Aggarwal & Samwick, 2003; Jensen, 1988).

A second group of researchers provide evidence to suggest that firm diversification may enhance performance. Billet and Mauer (2000) develop a model of equity restructuring that illustrates the linkages among firm's internal capital market, the potential for a spin-off, and the issuance of tracking stock. Hadlock, Ryngaert, and Thomas (2001) find that issues by diversified firms are viewed less negatively by the market than issues by non-diversified firms. Fauver, Houston, and Naranjo (2003) find the value of corporate diversification is negatively related to the level of capital market development, international integration, and legal systems. Their results suggest that there is not diversification discount and, in some cases, there is a diversification premium especially where capital markets are less developed.

Finally, other studies attempt to highlight the difficulties involved in precisely measuring the effect of diversification on firm performance. Campa and Kedia (2002) argue that the documented discount on diversified firms is not per se evidence that diversification deteriorates value. They proposed that diversification policy is endogenously determined by the firm's management along with other policies and firm characteristics that taken together, determine how investors value the firm.

Graham, Lemmon, and Wolf (2002) find that firms acquired in a diversifying merger have been discounted by capital markets prior to the merger announcement. Mansi and Reeb (2002) also find that diversification is insignificantly related to excess firm value. Thus, diversification discount observed in many studies may be artifacts of measurement errors in using Tobin's q as a proxy for firm value. In

short, results from previous studies on the diversification effect are neither consistent nor conclusive, which may be due to econometric problems.

Diversification strategies may or may not have a direct effect over performance. Some scholars show results to suggest that diversification effects change across time. Most of the findings on the diversification performance of the firm are based on static sample periods (cross-sectional studies) where no further tracking of the diversification's effect is considered throughout the entire period. To determine how performance changes as a function of diversification level at different moments it is important to trace the same firm portfolios at different intervals within the period of consideration. By doing so, it is possible to compare the diversifying firm's performance in the course of the full sample period. Hence, it is possible to determine if the diversification effect on firm performance is driven by time-varying factors. Some studies reveal that the diversification effect on firm performance is different for different time periods. This occurs even using the same sample and methodology to evaluate the effect.

Hyland and Diltz (2002) find evidence that may explain the diversification discount. Their results suggest that in the period of diversification and up to five years after diversifying, firms have negative long-run abnormal performance. Examination of the two-day announcement period returns provides evidence of increased performance, at least upon the announcement of a diversifying event. The authors conjecture that if the immediate impact and the long-run consequences of corporate diversification differ in direction, then it is possible that diversification enhances firm performance in some economic climates and reduce it in others.

McGahant (1999) examines firm diversification controlling for year, industry, corporate focus and firm effects on corporate performance. The author finds that year effects had a small but significant impact on corporate performance. These results reflect shifts in macroeconomic conditions that affected industries and firms differently, may have generated transient industry and firm performance effects.
Servaes (1996) examines q-ratios for various sub-samples and over various time periods. The results suggest that diversified firms are valued at a discount relative to single-segment firms during the 1960's and the discount vanished during the 1970's. The author concludes that the market's assessment of the cost of diversification has varied over time.

Whether or not diversification promotes efficiency, it is definitively guided by different managerial motives and it is likely to differ across firms, across industries, and through time. Although most of the studies on this area have been performed over a relatively small period of time (five to ten years on average), once the sample is chosen, no further tracking on the diversification status of the firm during the period under study is considered. Consequently, there is no definite or consistent evidence to suggest that the diversification effect on firm performance is dependent on the period that diversification takes place.

DATA AND METHODOLOGY

To test the effects of diversification on firm performance, a sample containing non-diversified (single-segment) and diversified (multi-segment) firms is used. The sample used consists of all firms with available data from Compustat Industry Segment Database and Research Files for the period between 1979 and 2006. In 1976 the Financial Accounting Standard Board (FASB) issued Statement of Financial Accounting Standard No. 14 (Financial Reporting for Segments of a Business Enterprise). It requires that for fiscal years starting after 1978, firms had to report information about the industry segments in which they operate. Therefore, in order to have a complete data set for all the firms selected, 1979 is chosen as starting point for this sample.

Consolidated firm data is obtained from Compustat Industrial Annual database for this period. Stock returns are obtained from the Center for Research and Security Prices (CRSP), Monthly Stock database. The Fama-French three-factor and the momentum factor data were directly downloaded from Kenneth R. French Homepage Data Library (French, 2007). The sample includes a set of firms that meet the following criteria: (1) they are listed in COMPUSTAT at any moment from 1979-2006 (active and inactive firms); (2) firms are classified by the North American Industry Code System (NAICS), as well as their correspondent segments and (3) firms and their segments have annual total sales available during the study period.

Consistent with previous studies, (Berger and Ofek, 1995; Lang and Stultz, 1994), firms with primary NAICS codes in the finance and insurance industry (NAICS industry sector 52) are eliminated, as they typically have financial ratios that are difficult to compare to firms in other industries. Additionally, utilities firms are eliminated (NAICS industry sector 22) from the sample because of their highly regulated nature.

These filters yield 185,001 total firm-year observations. In total 17,929 consolidated firms are included in the sample. The segments included by using the same filters, and matched up with their correspondent consolidated firms, yield 523,256 segment-year observations.

A given firm is defined as "diversified" once the number of reported segments for the firm increases to more than one. This is essentially the same selection sample criteria used by Lang and Stultz (1994), Berger and Ofek (1995), and Comment and Jarrell (1994). Using this criterion, the final sample consists of 78 non-diversified (single-segment) firms and 17,851 diversified firms.

Table 1 presents an overview of the sample and the level of diversification per year. In 1979, 49.16% of the total sample operates in a single segment and 50.82% in more than one segment (29.4% of the firms operate between 3 and 4 segments). Then after the 1991-1994 period, the percentage of single–segment firms in the sample declines from 10% for the 1995-1998 period to 8.80% for the 1999-2002 period. There is almost no difference between the 1999-2002 and 2003-2006 periods. From 1999 to 2006, diversification activity is greater for firms with five or more segments than for the lesser diversified firms.

Table 1: Percentage of Firms Operating in 1 to 7 or more Business Segments

	Periods						
Average No. of Segments	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998	1999-2002	2003-2006
1	49.18%	59.38%	60.57%	60.47%	50.77%	41.97%	42.72%
2	6.97	7.07	6.98	7.52	13.50	8.33	4.96
3	18.04	15.87	16.16	16.36	15.73	15.75	16.30
4	11.37	8.28	7.65	7.34	9.96	11.29	11.00
5	6.03	4.31	3.90	3.80	4.77	7.79	7.68
6	4.26	2.68	2.60	2.45	2.64	5.94	5.79
>7	4.16	2.42	2.13	2.07	2.62	8.93	11.54
Total	100%	100%	100%	100%	100%	100%	100%
No. of Firms	4,063	6,125	6,417	6,903	8,886	8,691	6,679

Summary Statistics

Once firms are selected, they are included in a portfolio. Non-diversified and diversified portfolios are formed based on separate size and value characteristics. Market capitalization (MCAP) and book-to-market ratio (BM) are defined following Fama and French (1996). The first set of reference portfolios includes ten value-based portfolios. Each portfolio is rebalanced in December of each year. In December of year t-1, all firms are ranked on the basis of book-to-market ratios. Value deciles are then created

based on these rankings for all the diversified firms as well as non-diversified firms reference portfolios. This is denoted by ND-1 and D-1 with the lowest book-to-market ratio for the non-diversified and diversified firm portfolios respectively whereas ND-10 and D-10 the portfolios with the highest book-to-market ratios. The second set of reference portfolios is ten size-based protfolios that were formed using the same procedure used to form the value-based portfolios.

Longitudinal studies are those where specified relationships among subjects or events are measured repeatedly on the same over time, with the objective of studying both the level and change in outcome across time as a function of subject characteristics. Longitudinal studies also have the virtue of being able to exclude time-invariant unobserved individual differences, and observing the temporal order of events. To test the influence of time over the diversification effect on firm performance, a sub-sample of firms is obtained from the previous sample. From the 78 non-diversified firms that are active at any moment during the full sample period, 39 are selected because they are continuously active during the1979-2006 period. From all multi-segment firms active continuously during the study period, 39 comparable firms with the single-segment firms were selected. Finally, these firms are ranked on the basis of book-to-market ratios (BM), and market capitalization (MCAP). In order to avoid changes in portfolio composition, once a firm is included in a portfolio, it cannot be reclassified to another. This allows for easier comparisons between firms and avoids problems due to differences in firm-specific characteristics. The sub-sample consists of five separate book-to-market quintiles for the non-diversified and diversified firm portfolios. Same amount of portfolios are formed based on market capitalization. This yields 25,272 firm-month observations, 324 firm-month observations per portfolio quintile, and 1,620 firm-month observations for the full period test, for each set of diversified and non-diversified firm portfolios.

Estimation Model

This study employs Carhart (1997) four-factor model, inspired by the Fama and French (1993) three-factor model, plus the momentum factor to estimate the effect of diversification on firm performance. This model contributes to control for other influencing factors on firm returns and adjusts for risk factors. Fama and French (1993) find that the three-factor model may explain the cross-sectional variation of stock returns better than other models, hence a better and more reliable firm performance measure. Carhart (1997) finds that the four-factor model substantially improves, on the average, pricing errors of the Capital Asset Pricing Model (CAPM) and Fama-French (FF) three-factor model.

These are some of the reasons that motive this study to use this four-factor model instead of the more often used methods such as Tobin's q and the Firm Excess Value (Berger and Ofek, 1995) to measure firm performance. The intercept term (α) from the estimated regression, Equation (1), should be positive and statistically significant if the portfolio outperforms the market; negative and statistically significant if the market does better than the observed portfolio. To test the diversificaton effect over firm performance, the alphas from non-diversified and diversified firm portfolios's estimations are compared.

Estimation of Portfolio Performance

Following the formation of the portfolios, the following equation is estimated:

$$Ri,t= \alpha +\beta_1 XMKT_t + \beta_2\ SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_i \qquad (1)$$

where $R_{i,\ t}$ is the monthly portfolio excess return and α is the estimated intercept term that measures the portfolio performance. The *XMKT* ($R_m - R_f$) represents the monthly excess return on the market portfolio.

SMB is intended to capture size effect and represents the monthly difference between the returns on small and big stock portfolios with the same approximate book-to-market equity. *HML* is intended to capture the book-to-market effect and represents the monthly difference in returns between a portfolio of high book-to-market firms and low book-to-market firms. *UMD* is the momentun factor constructed as the equal-weight average of firms with the highest 30 percent 11-month returns lagged one month minus the equal-weight average of firms with the lowest 30 percent eleven-month returns lagged one month. *UMD* is intended to capture cross-sectional return patterns (Carhart, 1997). The random errors are captured by ε_i.

This model is estimated using Ordinary Least Squares (OLS) techniques. The sample is divided into seven four-year periods. The first subperiod starts in 1979 and the last subperiod starts in 2003.
Finally, to measure the diversification effect on firm performance, a test for the equality of means is performed on each comparable set of non-diversified and diversified firm portfolios performance, as measured by their average estimated α's. Statistically significant difference between the diversified and non-diversified portfolios' α denotes the presence of a diversification effect on firm performance.

EMPIRICAL RESULTS

After controlling for other factors that may influence firm's performance, four-factor regression estimates suggest that on average, diversified (multi-segments) firms underperform comparable non-diversified (single-segment) firms. This fact is particularly evident for some specific study sub-periods for which the non-diversified firm performance is statistically significant and positively higher than the performance of the diversified firms. Additional empirical analysis shows that diversification effect on firm performance changes over time, since the diversification discount tends to decline for the second half of the sample period. Moreover, diversified firm performance is better than comparable non-diversified firm performance for particular periods and firms.

For the ten BM reference portfolios, excess returns of non-diversified firms in excess of the risk-free rate ($R_{it}-R_f$) are explained largely by the four-factor model. In these models, the regression coefficients medians of XMKT (R_M-R_f), *SMB*, and *HML* are 0.947, 0.705, and 0.571, respectively. But for the MCAP portfolios the values change to 0.941, 0.561 and 0.414, respectively. The momentum factor is not statistically different from zero for both sets of portfolios. The FF three factors have regression coefficients that are significantly different from zero at 5% significance level. The R^2 statistic median for the BM portfolios is 0.389 and 0.479 for the MCAP portfolios. Thus, the model captures a significant amount of the cross-sectional variation in average stock returns of non-diversified firms.

Estimated coefficients for the four-factor regressions model of the diversified firms show that portfolio excess returns in excess of the risk-free rate ($R_{it}-R_f$) are explained largely by the four-factor regression model. In these models, the median of the regression coefficients of (R_M-R_f), *SMB*, and *HML* are 1.059, 0.386, and 0.338, respectively for the BM reference portfolios. However, for the MCAP portfolios the coefficients are 1.113, 0.504, and 0.505, respectively. The momentum factor is not statistically different from zero for both sets of portfolios. All the FF three factors' regression coefficients are significantly different from zero at 5% significance level. The R^2 statistic median is 0.772 for BM reference portfolios and 0.754 for the MCAP reference portfolios. Thus, the model captures much of the cross-sectional variation of average stock returns of non-diversified firms. The four-factor model captures much of the cross-sectional variation of average stock returns of diversified firms and non-diversified firms. Thus, this factor model may be an effective means of controlling for influencing factors such as market condition, and firm specific characteristics on stock returns other than diversification.

Portfolio performance is assessed as the estimated intercept term from the four-factor regression model. The intercept term should be positive and statistically significant if the portfolio outperforms the market; negative and statistically significant if the market does better than the observed portfolio. Estimated intercept terms for the diversified and non-diversified portfolios are then compared to determine the effect of the diversification decision on firm performance.

Table 2 presents the intercept estimates (alphas) for the four-factor regression model for the whole sample of book-to-market (BM) portfolios and for the different sub-period portfolios. The first column shows the results for the whole sample period. The other columns show the results of the regressions' alphas for the seven four-year sub-periods. P-values of the intercept estimates (α) are reported in parentheses. Each BM portfolio is identified as non-diversified firm portfolio and diversified firm portfolio. For instance, ND-1 refers to the BM portfolio number one for the non-diversified set of firms and D-1 refers to BM portfolio number one for correspondent diversified set of firms.

The results in this table suggest that diversified firms tend to have a lower performance than the comparable non-diversified firms. Although there is no statistical difference between the means of the alpha estimates for the non-diversified and diversified portfolios for the full study period, the performance of the non-diversified firms tends to be better. This can be observed for the BM portfolios ND-2 vs. D-2, ND-4 vs. D-4, ND-5 vs. D-5 and ND-9 vs.D-9.

Some of the sample portfolios are not well specified by the four-factor regression model. These portfolios are ND-1, D-1, D-8 and D-10 from BM reference portfolios during the full period. Some models are not well specified for some sub-periods. When verified for the linear regression assumptions, the residuals of the models are non-normally distributed. Residual's normal probability plots for these models depart from the expected plot straight line (they exhibit a horizontal line). In addition, their histograms do not show a bell shaped form, characteristic of the Gaussian distribution. Non-normally distributed residuals distort the significance of tests resulting in the misspecification of the model. The rest of the estimated models follow the linear regressions assumptions. Estimated models for the MCAP reference portfolios, ND-5, and D-5, as well as several of the estimated models during the sub-periods, also present the same problem. Their residuals are not normally distributed, resulting in the misspecification of those models.

The intercept term estimates (alphas) for the portfolios based on market capitalization (MCAP), although to a lesser extent for the full sample period, present a similar pattern when compared to BM portfolios. Diversified firms tend to underperform non-diversified firms. This trend is only observed in portfolios ND-1 vs. D-1, and ND-9 vs. D-9. The alphas of the rest of the portfolios are not statistically different from zero.

Similar patterns can be observed by examining firm performance for the different four-year sub-periods. The diversified firm portfolios estimates show an inferior performance than the correspondent non-diversified firm portfolios for the MCAP reference portfolios during the 1983-1986, 1991-1994, 1995-1998 time periods, and for the BM portfolios during 2003-2006.
Table 3 presents the results of the test of equality of the means for the non-diversified (ND) and diversified (D) portfolios' estimated alphas. Mean differences for the comparable portfolios of non-diversified and diversified portfolios are reported for each four-year sub period (t-test probability is reported in parenthesis).

Table 2: Intercept Estimates (α's) from OLS Four-Factor Regression Model of the ten Book-to-Market (BM) Portfolios for the Non-Diversified Firms (ND-1 to ND-10) and for the Diversified Firms (D-1 to D-10). P-values are in parenthesis.

BM Portfolios	Four-Year Sub-Periods							
	1979-2006	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998	1999-2002	2003-2006
ND-1	0.039[a]	0.014**	0.000	0.013	0.006	0.119[a]	0.038	0.043[a]
	(0.072)	(0.092)	(0.974)	(0.463)	(0.355)	(0.482)	(0.171)	(0.024)
D-1	0.027[a]	-0.003	-0.012*	-0.004	0.048[a]	0.002	-0.003	0.192[a]
	(0.282)	(0.751)	(0.032)	(0.397)	(0.264)	(0.734)	(0.534)	(0.344)
ND-2	0.016*	0.007	0.014*	0.008*	0.007*	0.010	0.056[a]	0.000
	(0.016)	(0.268)	(0.015)	(0.032)	(0.048)	(0.157)	(0.224)	(0.963)
D-2	0.006*	0.009*	0.007*	0.004	0.007*	0.004	0.009**	0.002
	(0.000)	(0.033)	(0.035)	(0.275)	(0.040)	(0.208)	(0.093)	(0.338)
ND-3	0.008	0.003	0.005	0.004	0.014	0.000	0.002	0.005
	(0.362)	(0.635)	(0.370)	(0.277)	(0.797)	(0.967)	(0.736)	(0.257)
D-3	0.003*	0.008*	0.005*	0.007*	0.002	0.004	0.004	0.001
	(0.022)	(0.016)	(0.018)	(0.015)	(0.352)	(0.275)	(0.392)	(0.738)
ND-4	0.006*	0.007	-0.001	0.008	0.008**	0.007	0.007	0.009*
	(0.010)	(0.302)	(0.833)	(0.125)	(0.089)	(0.224)	(0.341)	(0.070)
D-4	0.004*	0.005	0.009	0.006*	0.004*	0.001	0.006	-0.001
	(0.016)	(0.214)	(0.141)	(0.010)	(0.056)	(0.674)	(0.125)	(0.540)
ND-5	0.009*	0.007	0.005	0.011*	0.017*	-0.003	0.005	0.039[a]
	(0.007)	(0.105)	(0.412)	(0.032)	(0.010)	(0.686)	(0.540)	(0.029)
D-5	0.001	0.001	0.000	0.001	0.001	0.000	0.012*	0.003
	(0.286)	(0.735)	(0.863)	(0.588)	(0.581)	(0.950)	(0.014)	(0.334)
ND-6	0.004	0.004	-0.001	0.005	-0.001	0.005	0.015*	0.002
	(0.211)	(0.397)	(0.841)	(0.439)	(0.767)	(0.321)	(0.030)	(0.921)
D-6	0.002	-0.002	0.004	0.004	0.002	0.000	0.008*	0.000
	(0.249)	(0.561)	(0.154)	(0.176)	(0.456)	(1.000)	(0.030)	(0.991)
ND-7	0.002	0.005	-0.003	0.003	0.004	0.003	-0.004	0.013
	(0.364)	(0.362)	(0.612)	(0.663)	(0.392)	(0.575)	(0.491)	(0.107)
D-7	-0.002	-0.002	0.001	0.001	-0.002	-0.004	0.003	-0.004
	(0.149)	(0.537)	(0.723)	(0.788)	(0.596)	(0.102)	(0.450)	(0.223)
ND-8	0.003	-0.001	0.002	-0.006	0.008	0.004	0.014*	0.002
	(0.167)	(0.819)	(0.673)	(0.514)	(0.312)	(0.639)	(0.031)	(0.854)
D-8	0.367[a]	-0.004	0.001	0.002	-0.004	-0.001	0.000	4.129[a]
	(0.219)	(0.107)	(0.681)	(0.404)	(0.231)	(0.673)	(0.965)	(0.089)
ND-9	0.005	0.000	0.000	-0.006	0.003	-0.002	0.012	0.257[a]
	(0.316)	(0.953)	(0.941)	(0.355)	(0.775)	(0.773)	(0.575)	(0.473)
D-9	-0.006*	-0.007*	-0.008*	-0.004	-0.002	-0.008*	0.000	-0.010*
	(0.000)	(0.039)	(0.005)	(0.285)	(0.545)	(0.043)	(0.941)	(0.026)
ND-10	0.002	-0.017*	-0.013*	-0.006	0.008	0.006	0.016[a]	0.019*
	(0.635)	(0.003)	(0.075)	(0.514)	(0.499)	(0.536)	(0.260)	(0.054)
D-10	0.021[a]	-0.013*	-0.010*	-0.011*	0.003	-0.006	-0.008	0.140[a]
	(0.622)	(0.001)	(0.035)	(0.078)	(0.584)	(0.346)	(0.329)	(0.682)

*Note. * and ** denote at 5% and 10% significance level; [a] model is not well specified*

The evidence suggests that diversified (multi-segments) firms underperform their matched non-diversified (single-segment) firms. This is especially true during the above mentioned specific sub-periods (MCAP reference portfolios during the 1983-1986, 1991-1994, 1995-1998 time periods, and for the BM portfolios

during 2003-2006), when the diversified and non-diversified performance differences are statistically significant. During these specific sub-periods the performance estimates for the non-diversified portfolios are better than those of the diversified portfolios.

The fact that the difference between estimated performance for the non-diversified and diversified portfolios is statistically significant for only some sub-periods, suggests that the diversification effect on firm performance varies over time. Thus, the second set of regressions test the influence of time over the diversification effect on firm performance. Evidently, it is conceivable that differences in the time frame covered by different studies could be a factor contributing to the observed results. It is important to remember that to test the diversification effect on firm performance over time, only firms that survived the 28 year study period are included in this sub-sample. This is done to avoid portfolio composition changes and to track the same firms the whole sample period and through the four-year sub-periods.
Is important to comment that the 'survivorship bias' may have influenced this results since only active firms were included for the 28 year sample period. Elton, Gruber, and Blake (1996) survivorship bias estimation method was used to estimate the survivorship bias for the sample. A survivorship bias of 15 basis points per annum is observed. This number is expected to be larger given the higher variance of the securities. Therefore, it is assumed that the survivorship bias is negligible for this sample results.

Table 3: Test Of Equality Of Means From Non-Diversified (ND) And Diversified (D) Portfolios Estimated Alphas.

	Mean difference between (t- Test Probability)						
1979-2006	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998	1999-2002	2003-2006
	Book-to-Market Reference Portfolios						
0.0024	0.000	0.0019	0.0017	0.0021	0.0008	0.000	0.0039**
(0.247)	(1.000)	(0.509)	(0.403)	(0.310)	(0.343)	(1.000)	(0.057)
	Market Capitalization Reference Portfolios						
0.0036	0.0003	0.0021**	0.0025	0.0056*	0.0025**	0.0017	0.000
(0.139)	(0.377)	(0.089)	(0.151)	(0.008)	(0.084)	(0.171)	(1.00)

*Note. * and ** denote at 5% and 10% significance level*

Table 4 presents the intercept estimates (α's) from the OLS four-factor regression of the five BM portfolios for the non-diversified firms (ND-1 to ND-5) and for the diversified firms (D-1 to D-5). The results in this table provide evidence that the diversification effect on firm performance is time dependent and influenced by the market conditions. Although for the full sample period the difference between non-diversified and diversified performance means is not statistically different from zero, some interesting trends are observed during several sub-periods. Surprisingly, performance of the diversified firm portfolios is better than the comparable non-diversified firm performance for BM portfolios.

This is observed for ND-1vs. D-1 and ND-2 vs. D-2, especially for the sub-periods 1991-1994, 1995-1998, 1999-2002 and 2003-2006. These periods follow the economic recession of 1990-91 and coincide with the 10-year U.S. economic expansion of 1991-2001. These performance results are consistent with Hill (1983), Ciscel and Evans (1984), and Amit and Livnat (1988a). Relative diversified firm performance is better during expansionary periods. During the previous sub-periods, there is no significant difference between the non-diversified and diversified firm portfolios. Estimated performance

for BM reference portfolios 3 and 4 are not statistically significant for both, the non-diversified and diversified firms.

Non-diversified and diversified portfolios, ND-5 and D-5 respectively, show negative performance results. This is consistent with the value versus growth investing strategies. The fifth portfolio is comprised of value stock firms that usually trade lower than their current intrinsic value. Hence, in comparison with the first and second set of portfolios (growth stock firms), these portfolios underperform. For the market capitalization (MCAP) reference portfolios, only three out of ten portfolios show statistically significant performance at a 10% significance level: ND-2, D-4, and ND-5. For the rest of the portfolios it is not statistically significant. Significant patterns or trends are not observed between the non-diversified and diversified firm performances, either for the full period or any sub-periods.

Table 4: Intercept Estimates (α's) from OLS Four-Factor Regression Model of the five Book-to-Market (BM) Portfolios for the Non-Diversified Firms (ND-1 to ND-5) and for the Diversified Firms (D-1 to D-5). P-values of estimated alphas (α) are in parenthesis.

BM Portf.[1]	**Four-Year Sub-Periods**							
	1979-2006	1979-1982	1983-1986	1987-1990	1991-1994	1995-1998	1999-2002	2003-2006
ND-1	0.013*	0.010	0.012	0.017*	0.016*	0.016*	0.015*	0.005
	(0.000)	(0.245)	(0.163)	(0.041)	(0.004)	(0.017)	(0.055)	(0.438)
D-1	0.011*	-0.011	0.005	0.017**	0.014*	0.022*	0.028*	0.017*
	(0.006)	(0.449)	(0.465)	(0.076)	(0.055)	(0.022)	(0.043)	(0.043)
ND-2	0.008*	0.008	0.013*	0.008	0.021*	-0.003	0.001	0.010*
	(0.007)	(0.465)	(0.092)	(0.140)	(0.002)	(0.662)	(0.001)	(0.024)
D-2	0.009*	0.015*	0.016*	0.009	-0.002	0.011*	0.018*	0.006
	(0.000)	(0.055)	(0.002)	(0.125)	(0.638)	(0.032)	(0.005)	(0.167)
ND-3	0.001	0.003	0.010	0.013*	-0.009	0.001	-0.003	-0.002
	(0.701)	(0.667)	(0.202)	(0.035)	(0.120)	(0.927)	(0.673)	(0.867)
D-3	0.003	0.007	0.011	0.007**	-0.002	-0.002	0.006	-0.003
	((0.360)	(0.300)	(0.460)	(0.071)	(0.630)	(0.623)	(0.432)	(0.589)
ND-4	0.000	0.004	-0.006	0.005	0.007	-0.012	0.007	-0.004
	(0.952)	((0.651)	(0.335)	(0.477)	(0.500)	(0.136)	(0.377)	(0.644)
D-4	-0.002	0.009	0.004	-0.002	0.005	-0.016*	-0.002	-0.008
	(0.317)	(0.326)	(0.482)	(0.719)	(0.422)	(0.000)	(0.491)	(0.124)
ND-5	-0.016*	-0.008	-0.011	-0.021	-0.022[a]	-0.007	-0.013*	-0.019
	(0.000)	(0.197)	(0.363)	(0.013)	(0.212)	(0.491)	(0.077)	(0.134)
D-5	-0.008**	-0.011*	0.005	-0.015*	-0.004[a]	0.007[a]	-0.026*	-0.026[a]
	(0.071)	(0.006)	(0.741)	(0.006)	(0.682)	(0.676)	(0.015)	(0.015)

Note. [1] *Once the portfolio is set the first year of the study (1979) it is not allowed to change through the subsequent sub-periods to detect any variation of the diversification effect on firm performance, controlling for firm specific characteristics. * and ** denote significance at 5% and 10% respectively.* [a] *denote that model is not well specified. N=324 observations for full period. N=48 observations for each 4-year sub-period.* R^2 *range = 0.604-0.187 (0.415 average).*

CONCLUSIONS

The debate between the benefits and the costs of diversification still continues. There is a large amount of literature providing evidence both in favor and against the diversification effect on firm performance.

Many studies suggest that diversification deteriorates firm value or firm performance (Berger & Ofek 1995; Lang & Stulz 1994; Servaes 1996). Many other researchers claim that refocusing creates value or improves firm performance (Berger & Ofek, 1999; Comment & Jarrell 1995, Daley, Mehrotra, & Sivakumar (1997); John & Ofek, 1995). Other studies simply argue that the aforementioned studies suffer from econometric problems and that the results of these studies are based on samples or methodologies that may not be adequate.

The costs of a reduction in firm performance of a diversified firm may arise from inefficient allocation of capital among divisions of a diversified firm (Lamont & Polk 2001; Scharfstein & Stein 2000, Rajan *et al.* 2000). Agency problems in a diversified firm can also generate costs of diversification. These problems, resulting from sub-optimal behavior of divisional managers, may occur in a diversified firm due to opportunistic behavior of divisional managers, information asymmetries between central management and divisional managers, and the difficulty of designing optimal incentive compensation schemes to eliminate agency costs (Aggarwal & Samwick, 2003; Denis *et al.,* 2002; Harris *et al.,* 1982; Jensen, 1988). Despite that several studies find that diversification may have a negative impact on firm performance, other studies find contradictory results.

The benefits that arise from diversification may come from different sources. For example, they may come from managerial economies of scale (Chandler, 1977) or from more efficient resource allocation through internal capital markets (Stein, 1997; Stulz, 1990). Other studies suggest that those benefits may appear due to the diversified firm's ability to internalize market failures (Khana & Palepu, 2000), or higher productivity of diversified firms (Schoar, 2002).

On the contrary, other studies concentrate on issues that shed doubt on the above justifications or on the existence of the "diversification discount". Some of these studies find that there are sample selection and measurement error problems associated to studies that examine the "diversification discount". Whited (2001), for example, demonstrates that there is a serious measurement error associated with Tobin's q, and that the investment-q regressions lead to an erroneous conclusion of inefficient internal capital markets. Mansi and Reeb (2002) find no losses associated to diversification; there is only a value transfer from shareholders to bondholders. Alternatively, the "diversification discount" may not be a result of diversification, but rather the results from merging activity between one or more "discounted" firms (Graham et al., 2002). This discount may have induced the firms to diversify in the first place, and thus the direction of causality is unclear (Matsusaka, 2001). Similarly, the evidence in Hubbard and Pahlia (1999) show that most conglomerate mergers in the 1960s involved financially distressed firms.

Because there is no consensus in the literature regarding the link between corporate diversification and firm performance, the purpose of this work was to empirically examine the marginal effect of diversification on firm performance. The four-factor model based on Fama and French (1993) three-factor model plus the momentum factor (Carhart, 1997) were used to estimate the diversification effect on firm performance and to control for other influencing factors over performance. The performance of the ten value reference portfolios and the ten size reference portfolios of separate diversified and non-diversified firms were compared using Jensen's alpha as the performance indicator. Furthermore, this work attempts to shed some light on the diversification time-varying effect.

Although for the full period, differences between non-diversified and diversified firm performance are not statistically different from zero, non-diversified firms show a tendency to outperform the diversified firms. When examining for the performance difference during different study sub-periods, statistical

significance is observed between several portfolios at specific sub-periods. These results suggest a negative relationship between diversification and firm performance.

Longitudinal analysis results suggest that diversification effect may be different across time, depending on external factors that may influence the firm. Despite that for the full period there is no difference between non-diversified and diversified firm performance, estimated performance results from several of the study sub-periods show some interesting trends. It is observed that during the periods between 1995-1998, 1992-2002, and 2003-2006, diversified firms from the lower BM portfolios, outperform non-diversified firms. Precisely, these sub-periods coincide with the U.S. 10-year economic expansion period (1991-2001). This evidence suggests that during economy upturns, diversified firms tend to outperform non-diversified firms. These findings are consistent with Hill (1983) and Ciscel and Evans (1984).

Hill (1983) concludes that the performance of the conglomerates improves significantly more than that of non-conglomerates during the upturn. The author also finds that these firms deteriorate more rapidly during the downturn in comparison to the two non-conglomerate categories. Ciscel and Evans (1984) find that moderate levels of diversification improve relative performance in expansionary periods, while high levels of diversification generally hurt performance during recessionary periods.

The main contribution of this research is twofold. First, this study uses a larger and more recent sample of U.S. publicly traded firms. By using this sample, this study finds evidence that supports the postulated negative diversification-performance relationship. Second, it finds evidence on the diversification time-varying effect. Understanding the circumstances of diversification effects on firm performance is not only interesting for the academic point of view; it is important for investment markets, as well as for firm management. A better knowledge of the drivers of diversification and its effects on firm performance should allow investors to improve their strategic and tactical asset allocation decisions. Managerial or investment decisions must be carefully taken, considering temporal effects, market and economic conditions.

As in all studies, this research has its limitations. One of its main caveats arises from the limitation to use only the Compustat Segment Database. This database is not always clear about the reported segments for a firm (Villalonga, 2004; Graham et al. 2002). Limitations with respect to intra-segment information do not allow to estimate firm diversification level using more sophisticated and accurate measures, and to replicate other studies such as Berger and Ofek (1995).

Future research in this area can be pursued along several avenues. It is important to carefully continue evaluating the performance of diversified firms using a variety of samples and empirical methodologies. To test the hypothesis that the effect of diversification on firm performance is not a consequence of measurement errors, one sample should be analyzed using several of the most frequently used methodologies such as: Berger and Ofek (1995) firm excess value; Tobin's q; four-factor model, and propensity score matching (Villalonga 2004). In this way the issue of using different samples from different data sources is resolved, giving tests results more credibility.

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